REMARKS/ARGUMENTS

This Amendment and the accompanying RCE are being filed in response to a personal interview held between the examiner, the inventor and the undersigned's Washington associate. Since the undersigned did not attend, this interview summary is an outline based on what I understood happened at the interview. I understand that the inventor showed the examiner filters and parts of filters in accordance with the present invention as well as prior art filters. I understand the examiner was also shown documentation supporting the advantages of filters in accordance with the present invention, as well as test results and other information on filters in accordance with the present invention. The undersigned thanks the examiner for the time, attention and courtesy given in the interview.

In response to the interview, the independent claims in the case have been carefully amended, and new claims added to provide greater novelty and specificity to the claims. In the following remarks, certain Exhibits are presented in support of the remarks, some of which have been previously presented. However for completeness in this response, they are again presented to provide a self-contained presentation.

In any oil filter, such as but not limited to engine oil filters, an ideal filter should adequately filter the oil while not imposing much restriction on the oil flow through the filter. Restricted flow means pumping power loss through the filter and a decrease in engine oil pressure and lubrication. Also in the event restrictions in the filter cause the opening of the bypass valve, that valve should open at a predetermined pressure difference across the filter element, and once open, not create further flow restriction.

Restrictions in an oil filter arise from various sources. Typically oil is provided to an engine oil filter through one opening in the filter mount and exits from the filter though a second opening (See Exhibit A). This Exhibit is discussing ways of improving the performance of the Ford 460 Big Block engine, though is representative of many if not most engines. Note the statement that "There are some important points to address when building a hot 460, and most of them are oil-related." Note also the picture in the lower right corner, showing the smoothing and opening of the oil filter return on the filter mount. Because of the limited size of the typical supply and return ports on a filter mount, oil may be received at a substantial flow velocity (if the filter doesn't significantly restrict the oil flow). Most filter housings have relatively small holes leading to the filter element (see the prior art filter in Figure 1 of the present application), requiring the oil coming to the filter from the filter mount to turn 90 degrees to find an opening to enter the filter, then turn another 90 degrees to actually enter the filter, thereby twice dissipating most of the kinetic energy in the flowing oil. In that regard, note that the openings 26 in the prior art filters open straight to the outer periphery of the filter element, putting the openings typically radially outward from the usual supply port on the filter mount. In the present invention, the annular arc segment shaped openings start from the first side of the cap at locations within the outer diameter of the filter element (independent claims 8 and 19) and thus are better positioned to receive oil from the supply port without requiring a significant change in direction. In that regard, note that in the present invention, the annular arc segment shaped openings taper outward to the second side of the cap outside the outer diameter of the cap to

define a smooth, expanding area flow path from the first side of the cap to the second side of the cap and to an outer periphery of the tubular woven metal mesh filter element therein. Thus very little redirection of the flowing oil is required. Further, the tapering outward of the annular arc segment shaped openings provides the expanding area flow path, slowing the oil velocity and recovering some of the kinetic energy in the flowing oil while delivering the oil directly to the periphery of the filter element. Finally, note that the annular arc segment shaped openings collectively occupy most of a full annular area, making it most likely that the oil flow from the filter mount will be directly toward one of these openings, and if not, the small separation between openings will not require much flow redirection to pass into the openings. All of these limitations are in the independent claims as amended, and are not disclosed or rendered obvious by the prior art.

Exhibit B provides data taken from the Internet for representative prior art filters manufactured by Wix. These filters are representative of the prior art and not selected because of any unusual poor performance. Note that typical oil flow rates are 7 to 9 and 9 to 11 gallons per minute, with a large filter for large trucks and tractors flowing at 18 to 20 gallons per minute. Exhibit C presents test results from Southwest Research Institute for a big truck filter in accordance with the present invention, showing a flow rate of over 90 gallons per minute with only a 2 psi pressure drop across the filter. Better oil flow through the filter means less loss in the oil filter, better lubrication of the engine and lower oil temperatures. Exhibit D shows the net result in this case is a significant increase in the peak power output of an engine. In an engine for everyday car or truck use, this would mean a lower accelerator setting for the same power output, increasing engine efficiency and reducing emissions, and of course making more power available when needed.

It should be noted that because of the design of the present invention, the burst pressure of the filter may be made very high. While the burst pressure of prior art filters is typically in the 200 to 350 psi range (see Exhibit B), Exhibit E shows a burst pressure for a filter in accordance with the present invention of over 1000 psi, making the present invention filters useful for hydraulic systems also. In that regard, Exhibit F shows the superior performance of the present invention for aircraft use. Note that the present invention reduced the oil temperature by 6 degrees, a significant reduction over that of prior art filters for such use. The present invention filters are now in fact approved for aircraft use.

With respect to the bypass valve, the bypass valve as claimed provides a large flow path, necessary so as to not significantly restrict flow beyond that caused by the pressure drop required to open the bypass valve. The undersigned understands that the inventor showed the examiner examples of prior art bypass valves with their relatively restricted flow areas when open. In that regard, it is noted that Cox is cited as a prior art example of a bypass valve. Not only does Cox show a bypass valve with what appears to be a highly restricted flow path when open, Cox actually shows a filter with two filter screens, with the bypass valve bypassing either one screen or the other (Figure 1 or 2) but not both, so it doesn't even provide a bypass from filter input to filter output.

Finally, note the award documented in Exhibit G. The improved performance over other filters, due to the structure claimed, and such industry recognition and approval, is believed to prove lack of obviousness over the prior art.

CONCLUSION

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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Dated: 09/01/2006

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